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On trade creation and regional trade agreements: does depth matter?

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Abstract Regional trade agreements (RTAs) are usually classified according to their form into four broad categories: preferential arrangements, free trade agreements, customs unions and common markets. This paper investigates whether the form/depth of RTAs matters concerning their effect on trade. I use a proper specification of the gravity model with panel data on the 1960–2000 period, which specifically control for self-selection into agreements. Results show that creating any kind of RTAs providing trade preferences to their member countries significantly increases bilateral trade. Nevertheless, their average treatment effect on bilateral trade does not significantly differ according to the depth of agreements.

Keywords Trade · Regionalism

JEL Classification F10 · F15

1 Introduction

At the end of 2005, 158 regional trade agreements (RTAs) were in force worldwide, which makes preferential trade liberalization a prominent feature of the international trading system today. The scope and coverage of these agreements nevertheless greatly differ from one to the other, in terms of trade flows, membership as well as population involved.

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The canonical taxonomy of RTAs, initially introduced by Balassa (1961), considers regionalism as a gradual process towards economic union, through free trade area, customs union (CU) and common market (CM). The implicit assumption behind is that more integrated arrangements provide for deeper trade integration, because each additional step of regional integration would reduce further intra-regional trade costs.[1] However, from a theoretical point of view, the "form/depth" of regional integration is not systematically related to the level of trade costs. If preferential arrangements (PAs) can be considered as free trade areas whose scope and coverage are less complete, a CU or a CM cannot be simply understood as further steps of economic integration. Devices of integration solely differ according to the form of trade integration: while entering a CU involves to give up sovereignty on trade policy to implement a common external tariff, free trade agreements (FTAs) allow member countries to keep the ability to set their tariffs vis-à-vis other partners, thanks to the use of rules of origin. Both nevertheless allow for broad preferential regimes, using different instruments of trade policy.[2] The degree of trade integration is thus likely to vary according to RTAs, but not necessarily in relation with their form or the depth of political integration they entail. This paper investigates empirically whether the form/depth of RTAs determines the extent of trade creation among members.

Empirical evidence of any larger effect of deeper RTAs on the volume of regional trade is missing. Few papers even distinguish between different categories of RTAs. Two exceptions are Ghosh and Yamarik (2004b) and Kandogan (2008), who find puzzling results concerning the effect of economic integration on intra-regional trade: coefficients on CU and CM membership dummies are found to be negative and significant in several specifications. However, it is worth noting that they do not control for multilateral resistance terms and, more importantly, for self-selection into RTAs. Indeed, papers on the determinants of RTAs suggest a "market for regionalism" view of regional trade integration, where countries choose their partners (Baier and Bergstrand 2004b) and the form of the RTA (Vicard 2008) according to economic and political determinants. Ex post estimations of the effect of RTAs on trade are thus likely to suffer from a selection bias, because pairs of countries which have more to gain from regional integration (or more to loose from no-agreement) are more likely to create a RTA and to choose the appropriate form of regional integration.

In this paper, I estimate a theoretically motivated gravity equation, in which the definition of RTAs is refined by introducing a distinction between different categories of RTAs according to their form/depth. Self-selection is specifically accounted for by using panel data with country-pair and country-and-time fixed effects or differenced panel with country-and-time fixed effects. Three important conclusions emerge from empirical results. First, unobservable heterogeneity affects differently the estimates of the treatment effect of different kinds of RTAs,

[1] For instance, Krueger (1997) argues that a free trade area cannot be more trade creating than a customs union because the former entails the implementation of rules of origin.

[2] For instance, the arrangements governing foreign investments under the NAFTA allow for a great mobility of capital.

i.e. different country pairs choose to create different kinds of RTAs. Second, the analysis conducted in this paper confirms that all RTAs providing trade preferences to their members have a significant positive effect on bilateral trade. Third, this average treatment effect does nevertheless not differ statistically according to the depth/form of integration. Once self-selection into agreements is controlled for, creating a free trade area, a CU or a CM has the same effect on intra-regional trade.

This paper proceeds as follows. Section 2 presents the extent of preferential trade in the world. Section 3 specifies a theoretically grounded gravity equation with panel data. Results are presented in Sect. 4 and some robustness analysis in Sect. 5. Section 6 concludes the paper.

2 Regional trade agreements in the world

Since World War II, the coverage and scope of regional trade integration have greatly expanded, from Benelux—the first RTA created in 1947 as a CU between three countries, Belgium, Luxembourg and the Netherlands—to the 158 RTAs in force at the end of 2005, of which 125 were bilateral agreements[3]. These agreements range from the simple exchange of trade preferences on a limited range of products to the harmonization of policies well beyond tariffs, such as competition policies, infrastructure or standards. The creation of RTAs and their form are constrained by international rules agreed under the General Agreement on Tariffs and Trade (GATT), and now under the WTO. On the one hand, RTAs are a deviation from the principle of equal treatment defined by the "most-favored-nation" clause. Two articles frame their creation. GATT's article XXIV allows the creation of FTAs or CUs which removes tariff barriers on substantially all trade in goods. On the other hand, the so-called "enabling clause" permits PAs among developing countries, which are partial scope agreements on trade in goods. WTO rules specifically forbid the creation of PAs including developed countries.

Out of the 158 RTAs in force at the end of 2005, 2 were CMs, 11 CUs, 122 FTAs and 23 PAs. However, in terms of the number of country pairs covered, FTAs are not overwhelming since they are mostly bilateral agreements. Figure 1 depicts the evolution of country-pair membership to RTAs according to their form over the period from 1948 to 2005. It shows that pairs of countries which are members of a RTA represent about 14% of country pairs worldwide in 2005, from only 1% in 1948 and around 4% in the 1980s. Trade flows between RTA partners nevertheless represent one third of world trade today (World Bank 2005), which underlines that trade agreements are signed between countries trading intensively with each others.

Preferential arrangements prevail thanks in particular to the Protocol Relating to Trade Negotiations among Developing Countries signed in 1973 by 16 countries

[3] The focus of this paper is on reciprocal agreements on trade in goods, so these figures do not include non-reciprocal arrangements like Generalized System of Preferences (GSP), as well as service agreements notified under the General Agreement on Trade in Services (GATS) article V.

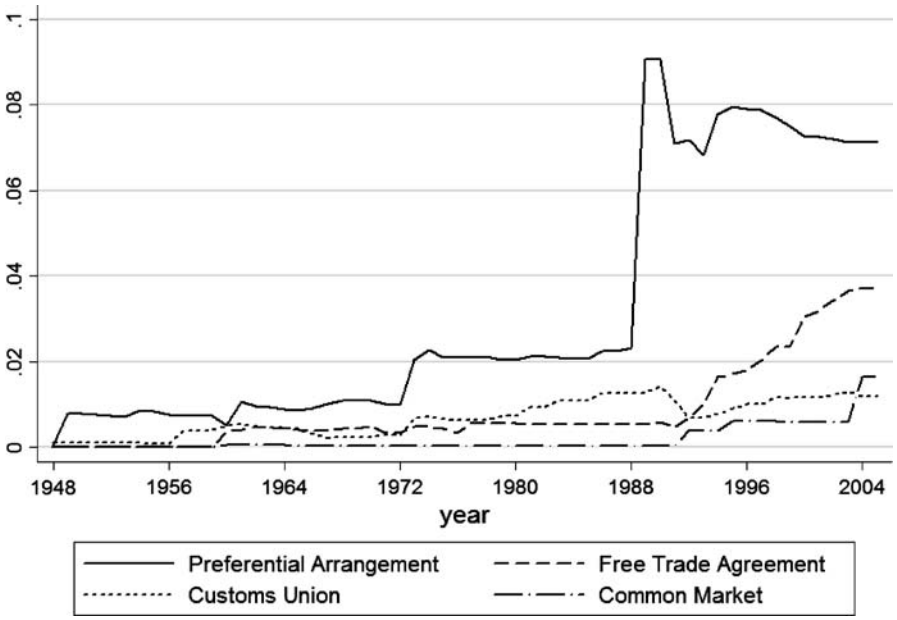

Fig. 1 Membership in RTAs (% of the total number of country pairs in the world)

and the Global System of Trade Preferences among Developing Countries signed in 1989 by 44 countries. CU was the second more prominent form of RTAs until the 1990s, when the number and coverage of FTAs exploded, in particular with bilateral agreements signed by the European Union (EU) with Central and Eastern European countries. These agreements were nevertheless cancelled in 2004 by the accession of the ten new members to the EU, slowing down the growth path of FTA coverage in the 2000s. FTAs cover almost 4% of country pairs at end of 2005. CMs cover only two pairs of countries (under Benelux), from 1961 to the creation of the EU in 1992. This form of RTA then expands rapidly with the enlargement of the EU and ranks third in term of global country-pair coverage. The overwhelming prevalence of FTA in absolute number is dramatically reduced in terms of country-pair coverage, since CMs cover almost half of the number of country pairs under a FTA.[4]

A quick look at the data seems to rule out the idea of a graduate process of regional integration suggested by the traditional classification of RTAs presented above. Deeply integrated RTAs seem to be created directly as such. Indeed, out of the 18 CUs created worldwide since 1948, 14 have been created directly as such, without any intermediate step like a PA or a FTA. Out of the four remaining, two actually experienced a gradual integration, implying the creation of a PA or a FTA prior to CU, but on a short period of time [7 years for the Andean Customs Union and 5 years concerning the Caribbean Community (CARICOM)]. Besides, the West

[4] Fiorentino et al. (2007) moreover underline that planed RTAs are mostly bilateral FTAs.

African Economic and Monetary Union (WAEMU) and the Golf Cooperation Council (GCC) have been preceded during a significant period of time by a PA before adopting common external tariffs in 1998 and 2003, respectively. Two of these CUs turned into a CM (Benelux and the EU). Another exception is the complex network of bilateral FTAs created prior to accession to the EU. All remaining FTAs and PAs did not evolve into any "deeper" form of RTA.

3 A proper specification of the gravity equation

The impact of RTAs on trade is mostly measured ex post using a gravity equation (Frankel 1997; Carrère 2006). This model relates bilateral trade flows to the economic size of partner countries and their distance. Additional variables are generally added to this basic specification to control for different kinds of barriers to trade. More recently, papers providing formal economic foundations for the initially atheoretical gravity equation underlined the need to account for price levels to avoid any estimation bias due to the omission of exporting and importing countries' multilateral resistance terms (Anderson and van Wincoop 2003, 2004; Feenstra 2004). Anderson and van Wincoop (2003) derive these importer's and exporter's resistance terms from a full expenditure system on a cross-section of data, and show that including country-specific fixed effects yields the same results. Baldwin and Taglioni (2006) show that, because multilateral resistance terms are likely to be time varying, such methodology do not simply translate in a panel setting. A proper specification of the gravity equation with panel data requires to include country-and-time fixed effects, which account for multilateral resistance terms varying over time. Baier and Bergstrand (2007) suggest two econometric specifications of the gravity equation to properly estimate the average treatment effect of RTAs: panel data with bilateral and country-and-time fixed effects or differenced panel data with country-and-time effects. Including bilateral fixed effects or first-differencing data removes the bias arising from the omission of unobserved variables affecting both the explained (bilateral trade) and explaining variables (RTA membership dummies) and allows to take into account the endogeneity related to self-selection, since it is mainly a cross-sectional issue.[5] Indeed, Baier and Bergstrand (2004b) investigate the economic determinants of RTAs and find significant cross-section evidence that countries choose well their RTA partners, i.e. pairs of countries signing RTAs tend to share economic characteristics likely to enhance benefits from regional trade integration. They nevertheless identify only a subset of economic determinants of RTAs, which leaves a large unobserved heterogeneity. Baier and Bergstrand (2007) argue that the heterogeneity in determinants of trade, unobserved in estimations of gravity equations, is negatively associated to the decision to form a RTA. Not accounting for this heterogeneity would thus bias estimated coefficients on RTAs. On the one hand, suppose that two countries lack bilateral transport infrastructures

[5] Baier and Bergstrand (2007) review alternative methods to deal with this endogeneity bias. In particular, instrumental-variable estimation and Heckman's control function approach fail to solve the endogeneity issue.

or exhibit extensive domestic regulations reducing bilateral trade, and that these characteristics are unobservable to the econometrician—this creates a negative error term in the gravity equation. Expected gains from regional integration would be larger for these countries, and their government would be more likely to select into RTA, if creating a RTA not only reduces tariff barriers but also generates spillovers on regional infrastructures or leads to the harmonization of domestic regulations and standards. On the other hand, when unobserved cultural or historical characteristics shared by two countries increase at the same time trade flows and the likelihood of forming a RTA, by reducing costs related to regional integration for instance, then estimated coefficients would be biased upward. Anyway, the discussion above suggests that the decision to enter a RTA is mainly cross-sectional in nature, since it is related to the actual level of trade relative to its potential level. Recent changes in the level of trade are indeed not likely to lead to the creation of RTAs, but countries' structural characteristics are.

Yet, different kinds of RTAs are likely to be related differently to unobserved trade impediments or facilitation. As underlined by Anderson and van Wincoop (2004), in a politically fragmented world such as the international system today, international transaction costs have more to do with domestic policies (regulation, norms, property rights, infrastructures…) than traditional tariff barriers. The harmonization of these policies can be dealt with from several perspectives, using different instruments and producing different institutional frameworks. On the one hand, Anderson and Marcouiller (2002) and Blomberg and Hess (2006) respectively show that insecurity and violence are strong deterrent of trade. On the other hand, Vicard (2008) underlines that the determinants of RTAs differ according to the form/depth of integration. In particular, in a system where no supranational institution or third party can enforce property rights at the international level, country pairs experiencing interstate conflicts need mechanisms securing the continuity of trade flows in the future. Hence, CUs or CMs, which imply the creation of a strong regional institutional framework, are created between countries experiencing lots of interstates disputes, whereas international insecurity deters the formation of PAs and FTAs. Consequently, omitted security variables are likely to bias the coefficients on RTAs depending on their depth. When creating an RTA, country pairs thus choose the suitable form according to their economic, political or cultural characteristics. Accordingly, the omitted variable bias would differ between categories of RTAs.

In a cross-section of data, the only way to address such endogeneity is through the use of instrumental variables. However, no exogenous instruments are available (Magee 2003; Baier and Bergstrand 2004a). On the contrary, using panel data this endogeneity issue can be dealt with using country-pair fixed effects or by first-differencing the data. Because choosing between these two methods is difficult, Wooldridge (2003) recommends to report results using both. In the case of a large number of periods, the latter is likely to be more efficient when error terms exhibit substantial positive serial correlation. Unobserved factors influencing both our explaining and explained variables are likely to be changing slowly, i.e. to be serially correlated. As a robustness check, both methods are reported below, but our preferred is first-differencing the panel data.

Formally, the following theoretically motivated specification of the gravity equation is estimated:

$$\ln T_{ijt} = \beta_0 + \beta_1 \ln (\mathrm{GDP}_{it}\mathrm{GDP}_{jt}) + \beta_2 \ln \mathrm{DIST}_{ij} + \beta_3 \mathrm{Control}_{ij} + \beta_4 \mathrm{PoA}_{ijt} + \beta_5 \mathrm{PA}_{ijt} + \beta_5 \mathrm{FTA}_{ijt} + \beta_7 \mathrm{CU}_{ijt} + \beta_8 \mathrm{CM}_{ijt} - \ln P_{it} - \ln P_{jt} + t_{ijt} \quad (1)$$

Controls added are common to the gravity literature, i.e. bilateral distance and dummies for common border, language and colonizer, countries ever in a colonial relationship, and landlocked countries. All these time-invariant bilateral determinants of trade are dropped when bilateral fixed effects are introduced or data are first-differenced. In the same manner, GDPs as well as multilateral resistance terms (P_{it} and P_{jt}) are explained by country-and-time fixed effects.

The dependent variable T_{ijt} is the average of the log of two-way imports. Trade data originate from the International Monetary Fund's (IMF) *Direction of Trade Statistics* (DoTS) database, and are assembled by Martin et al. (2008). Data on GDP are taken from the World Bank's *World Development Indicators* database, and geographic and historical data come from CEPII.[6] Annual observations every five years over the period 1960–2000 are used, which leaves us with a sample of potentially 188 countries over nine periods, with gaps.

The average treatment effect of each kind of RTA on intra-regional trade is estimated separately, through the inclusion of four different categories of RTAs, according to their actual form (PA, FTA, CU and CM), to which Political Agreements (PoAs) are added.[7] All bilateral or RTAs in force at least 1 year between 1960 and 2000 are considered.[8] Unless otherwise mentioned in the sources, an agreement is assumed to be in force at the date defined in the treaty and, if not available, once the agreement has been signed and ratified. It nevertheless does not mean that all provisions of the agreement have been fully implemented at this date, since a phase-in period is often planned in the treaties. Each dummy variable is set at 1 when both countries of the pair are members of the same agreement during the year considered, i.e. at each of the nine years considered in our data set. The details of the official dates of RTAs and the dates actually used in our data set with 5-year intervals are provided in the Appendix. A pair of countries can thereby be member of only one kind of agreement a given year. The data set reports 146 RTAs over the period 1960–2000, of which 24 are coded as PAs, 103 FTAs, 17 CUs and 2 CMs, and 7 PoAs (a complete list is provided in the Appendix).

As argued above, I control for self-selection into RTAs either through first-differencing the data or including country-pair fixed effects. It means that only the time variation in RTA membership over the period covered by our data is accounted

[6] http://www.cepii.fr/anglaisgraph/bdd/distances.htm.

[7] A political agreement is defined as an organization aiming at liberalizing trade among its members but falling short of providing for tariff preferences inherent in a CM, CU, FTA or PA, such as the Generalized System of Preferences or the Everything but Arms regulation adopted by the European Union, which provide preferential or even duty free access to least developed or developing countries on a non reciprocal basis, are not considered in this paper.

[8] Data are assembled from notifications to the WTO (http://www.wto.org/english/tratop_e/region_e/region_e.htm), Foroutan (1993, 1998), Langhammer and Hiemenz (1990), Frankel (1997), Machlup (1977) and other public sources.

for, i.e. the effect of entering or leaving a RTA. In this specification, the coefficients on the membership dummies can be interpreted as the average treatment effect of entering in each kind of RTAs. For instance, the formation of the European Communities by the initial six members is not captured by the coefficient on the CU dummy since it occurred before the beginning of our time period, but the accession of new members and the exit of all members from the CU agreement to create a CM from 1992 on are. Thus, for the country pairs member of a preexisting CU, the coefficient on the CM dummy captures the effect of entering a CM, while not being member of a CU agreement anymore (the CU dummy is set at 0 for EU countries from 1992 on).

4 Results

Results are reported in Table 1. The first two columns present estimates of the traditional gravity equation, when only time fixed effects (column 1) or country-and-time fixed effects (column 2) are included. Remaining columns report estimates using the proper specifications of the gravity equation controlling for endogeneity. Coefficients on control variables are found significant and all have the expected sign—geographical distance impedes bilateral trade, as well as the fact to be landlocked, whereas sharing a common border, language or colonial history increases trade.[9]

Concerning our variables of interest, results are surprisingly diverging and large when controlling only for time fixed effects. The trade creating effect of regional integration range from a $e^{0.09} - 1 = 9\%$ increase for PAs to a 232% for PoAs and a 282% for CUs. When country-and-time fixed effects are included (column 2), coefficients on RTAs largely decrease, and the coefficient on CM becomes insignificant. In this specification, political agreements exhibit the largest coefficient, corresponding to a 101% increase in bilateral trade. The ranking as well as the size of coefficients cast doubts on the validity of these results.

First-differencing the data or introducing bilateral fixed effects to account for self-selection into RTAs reduces the coefficients on PoAs and shallow RTAs but increases the coefficient on CMs, which turns significant. Hence, the endogeneity bias arising from unobserved variables affecting bilateral trade flows and RTA membership differs according to the kind of RTA considered. It suggests that different kinds of country pairs choose to form different kinds of RTAs, and that the unobservable factors affecting the likelihood of RTA formation also affect trade, but unevenly according to the depth of integration.

Results do show a robust significant average treatment effect of all kinds of RTAs on bilateral trade, except that of political agreements in the first-differenced specification. In the preferred specification (column 4), a CM is associated with a current increase of 30% in bilateral trade, to be compared to 34% for a CU or a free trade area, and 18% for a PA. When RTAs are considered jointly (column 5),

[9] Results remain qualitatively similar when the coefficient on GDPs is constrained to 1, i.e. when the dependent variable is replaced by $\ln T_{ijt} = \left(\ln \frac{\text{imp}_{ijt}}{\text{GDP}_{it}\text{GDP}_{jt}} + \ln \frac{\text{imp}_{jit}}{\text{GDP}_{it}\text{GDP}_{jt}}\right)/2$.

Table 1 Gravity estimates with panel data

Dependent variable	$\ln T_{ijt} = \left(\ln \text{imp}_{ijt} + \ln \text{imp}_{jit}\right)/2$				
	(1)	(2)	(3)	(4)	(5)
Political arrangement	1.20*** (0.10)	0.70*** (0.09)	0.19*** (0.07)	−0.08 (0.07)	
Preferential arrangement	0.09* (0.05)	0.32*** (0.06)	0.21*** (0.06)	0.17*** (0.06)	
Free trade area	0.84*** (0.05)	0.59*** (0.07)	0.42*** (0.05)	0.29*** (0.05)	
Custom union	1.34*** (0.09)	0.64*** (0.11)	0.27*** (0.06)	0.29*** (0.07)	
Common market	0.89*** (0.06)	−0.14 (0.13)	0.49*** (0.08)	0.25*** (0.08)	
Regional trade agreement					0.23*** (0.04)
Log (*GDPi***GDPj*)	0.86*** (0.01)				
No. of landlocked countries	−0.28*** (0.03)				
Log distance	−0.88*** (0.02)	−0.92*** (0.03)			
Contiguity	0.30*** (0.08)	0.52*** (0.09)			
Common language	0.38*** (0.04)	0.37*** (0.04)			
Colonial link	1.22*** (0.10)	1.28*** (0.09)			
Common colonizer	0.66*** (0.07)	0.75*** (0.06)			
Constant	−6.48*** (0.19)	14.4*** (0.30)	0.12 (0.09)	0.55 (0.71)	0.55 (0.71)
Overall R^2	0.72	0.82	–	0.35	0.35
Within R^2	–	–	0.70	–	–
No. of observations	33,684	34,514	35,698	25,169	25,169
Time fixed effects	Yes	–	–	–	–
Country-and-time fixed effects	–	Yes	Yes	Yes	Yes
Country-pair fixed effects	–	–	Yes	–	–
First difference	–	–	–	Yes	Yes

Heteroscedasticity- and autocorrelation-robust standard errors in parentheses. Coefficients for time, country-and-time and country-pair fixed effects are not reported

*,**, *** Significance at the 10, 5 and 1% level, respectively

regional integration is found to increase intra-zone trade by 26%. These results are in line with the 36% contemporaneous effect found by Baier and Bergstrand (2007), on a different sample of countries and a restricted sample of RTAs excluding PAs.

A third important result is that the average treatment effects of all kinds of RTAs providing trade preferences to their members are statistically similar. Indeed, the hypothesis of equality of coefficients on the different kinds of RTAs (PoAs excluded) cannot be rejected, jointly and separately, at traditional level of significance in first-differenced specification, and the equality of coefficients on FTA and CM cannot be rejected in the fixed effect specification (see Table 2). If any, only PAs could be understood as a first step of integration providing for less trade integration than other more "integrated" agreements. This suggests that the institutional design of regional agreements does not determine their ability to create trade among members. The effect on trade of forming an FTA, a CU or a CM is not statistically different, but different country pairs form different RTAs.

This rather counterintuitive result is not so surprising in the light of the lack of theory actually predicting that an FTA would systematically reduce more transactions costs on intra-regional trade than a CU. It suggests that the choice of countries to create different forms of RTAs is not only related to trade issues. Notwithstanding, the fact that if similar country pairs were to enter a CU, an FTA or a CM, the effect on bilateral trade would be similar does not preclude any trade related determinants of the choice of RTAs. The fact that unobserved heterogeneity affects differently country pairs entering different kinds of RTAs suggests that gains from regional integration could differ according to characteristics of both member countries and specific trade agreements. These results could have interesting implications to explain the diverging effects of RTAs found in the literature (Ghosh and Yamarik 2004a). Overall, empirical evidence provided in this paper points out

Table 2 Wald tests of equality of coefficients on PA, FTA, CU and CM

Specification	All coeff.	PA-FTA	FTA-CU	FTA-CM	CU-CM
Basic specification					
Fixed effect	4.77***	8.75***	4.10**	0.62	8.27***
First difference	1.09	2.61	0.00	0.15	0.25
With lags (total ATE)					
Fixed effect	3.57**	9.82***	2.06	0.05	1.63
First difference	2.75**	5.56**	0.34	2.98*	1.66
Without bilateral RTAs					
Fixed effect	2.31*	2.55	1.69	0.30	5.33**
First difference	0.72	1.32	0.00	0.20	0.39
1990–2000					
Fixed effect	0.90	0.72	2.46	1.78	0.17
First difference	1.62	3.09*	0.16	0.01	0.41

*, **, *** Null hypothesis of equality of coefficients can be rejected at the 10, 5 and 1% level, respectively

that creating a free trade area, a CU or a CM has a similar effect on bilateral trade, but that different country pairs tend to create different kind of RTAs.

5 Robustness analysis

In this section, I test for the sensitivity of the above results to several sources of bias and perturbations, namely lagged effects, alternative sample of years and countries and definition of RTAs, and time-varying missing variables.

5.1 Lagged effects

Regional trade agreements generally plan a phase-in period during which provisions of the treaty are implemented gradually. They are thus likely to have lagged effects on trade, as all provisions of the agreement are generally implemented over a 5- to 10-year period of time. For instance, the treaty of Rome creating the European Economic Community in 1958 projected the full implementation of the CU in 1968. The date of entry into force of a RTA does not correspond to its full implementation, so that our membership dummy variable, which is coded 1 from the date of entry into force of the agreement, cannot account for this phase-in period. One-period-lagged variables of each of the dummies measuring RTA membership are thus added to our specification. Since some kinds of RTAs, notably CMs, have largely been created in the 1990s, we cannot account for further lags because the time span of our data set is not large enough.

Results, presented in columns (1) and (2) of Table 3, clearly confirm previous findings. All categories of RTAs, except political agreements in the first-differenced specification, significantly increase bilateral trade from their date of entry into force. Moreover, FTAs and CUs in the fixed-effect specification exhibit an additional effect after 5 years. The total average treatment effect after 5 years is 68 and 51% in the fixed-effect and first-differenced specifications, respectively, for FTAs, and 48 and 46% for CUs. The coefficient on the lagged term of CM membership is however not statistically significant. The fact that CMs have been preceded by CUs or bilateral FTAs is likely to explain the lack of significance of the lagged variable. The contemporary average treatment effect of a CM is nevertheless slightly larger that in our basic specification, namely 72 and 34% in the fixed-effect and first-differenced specifications, respectively. Again, the hypothesis of equality of coefficients on FTA, CU and CM cannot be rejected at traditional level of significance (see Table 2).

5.2 Samples of RTAs and years

Another source of heterogeneity is related to the definition of RTAs. Indeed, bilateral agreements are likely to differ substantially from regional agreements (including three or more partners) in terms of determinants as well as the institutional framework they provide. Columns (3) and (4) of Table 3 test for the robustness of the results of the previous section to the exclusion of bilateral RTAs in

Table 3 Robustness analysis: lagged effects and samples

Dependent variable	$\ln T_{ijt} = \left(\ln \text{imp}_{ijt} + \ln \text{imp}_{jit}\right)/2$							
	Lagged effects		Bilateral RTA excluded		OECD vs. RoW		1990–2000	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Political arrangement	0.17** (0.07)	−0.08 (0.07)	0.20*** (0.07)	−0.07 (0.07)	0.18*** (0.07)	−0.07 (0.07)	−0.01 (0.09)	−0.01 (0.07)
Preferential arrangement	0.16*** (0.06)	0.16*** (0.06)	0.22*** (0.06)	0.18*** (0.06)	0.20*** (0.06)	0.16*** (0.06)	0.30*** (0.11)	0.12* (0.07)
Free trade area	0.36*** (0.05)	0.28*** (0.05)	0.38*** (0.08)	0.28*** (0.07)	0.49*** (0.06)	0.30*** (0.06)	0.40*** (0.06)	0.27*** (0.06)
Custom union	0.18*** (0.07)	0.29*** (0.07)	0.25*** (0.06)	0.28*** (0.07)	0.18* (0.10)	0.23* (0.12)	0.23** (0.10)	0.31*** (0.08)
Common market	0.51*** (0.08)	0.27*** (0.07)	0.43*** (0.08)	0.23*** (0.08)	0.53*** (0.08)	0.29*** (0.08)	0.26*** (0.09)	0.26*** (0.09)
Political ($t + 1$)	0.03 (0.08)	−0.05 (0.07)						
Preferential arrangement ($t + 1$)	0.07 (0.05)	0.06 (0.05)						
Free trade area ($t + 1$)	0.16*** (0.06)	0.17*** (0.06)						
Custom union ($t + 1$)	0.19*** (0.07)	0.09 (0.07)						
Common market ($t + 1$)	−0.01 (0.06)	−0.02 (0.06)						
OECD × free trade area					−0.21** (0.10)	−0.06 (0.08)		
OECD × custom union					0.19* (0.11)	0.12 (0.13)		
OECD					0.23*** (0.07)	0.16*** (0.06)		
Constant	−0.01 (0.05)	1.31*** (0.43)	0.28*** (0.07)	0.55 (0.71)	0.14 (0.12)	−0.56 (0.71)	1.90*** (0.04)	1.33*** (0.22)
Overall R^2	–	0.35	–	0.35	–	0.35	–	0.30
Within R^2	0.70	–	0.70	–	0.70	–	0.36	–
No. of observations	35,697	25,168	35,698	25,169	35,698	25,169	17,890	12,895
Country-and-time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country-pair fixed effects	Yes	–	Yes	–	Yes	–	Yes	–
First difference	–	Yes	–	Yes	–	Yes	–	Yes

Heteroscedasticity- and autocorrelation-robust standard errors in parentheses. Coefficients for country-and-time and country-pair fixed effects are not reported

*, **, *** Significance at the 10, 5 and 1% level, respectively

our explaining variables. Results remain qualitatively similar: all kinds of RTAs are found to increase intra-zone trade, but this trade creating effect does not statistically differ according to the depth of integration.

Another source of heterogeneity within each category of RTAs may be related to country members. The specificities of the RTAs, and their effect on intra-regional trade, could indeed differ according to the level of wealth of member countries for each kind of agreement. In order to test the sensitivity of my results to this kind of heterogeneity, I include interaction terms between RTA membership dummies and a dummy equal to one when both countries are members of the OECD, as a proxy for pairs of rich countries. Since CMs have been created only among OECD members and preferential agreements are entitled only among developing countries, I add interactions with the FTA and CU dummies to the basic specification. Results are presented in columns (5) and (6) of Table 3. Interactions variables are not significant in the first-differenced specification, but are in the fixed-effect specification. The latter suggests that FTAs are less trade creating and that CUs are more trade creating among OECD countries; the coefficients on FTA among non-OECD members, CU among OECD members and CM are nevertheless not statistically different in the fixed-effect specification. In the specification in first-difference, the results remain qualitatively similar.

In addition, both the explosion of the number and coverage of RTAs (see Fig. 1) and the increased depth of agreements such as the EU since the 1990s have led some scholars to qualify this wave of regionalism as *new regionalism.* In this respect, it could be argued that determinants and characteristics of new RTAs signed in the 1990s could differ from previous agreements. In order to test for any specificity of this period, Eq. 1 is estimated on a sample restricted to the 1990s. Results are presented in columns (7) and (8) of Table 3. The average treatment effect of each kind of RTAs is similar when estimated only over the 1990s and on the whole year sample. Results diverge only concerning PAs, for which the coefficient is slightly larger in the fixed-effect specification and insignificant in the differenced specification. Anyway, Wald tests of equality of coefficients on all categories of RTAs providing for trade preferences are not rejected in both specifications (see Table 2), confirming that the treatment effect of RTAs on bilateral trade does not differ according to their form.

5.3 Time-varying country pair–specific determinants of trade

Country-and-time dummies included in all our specifications control for all country characteristics likely to affect trade, time-invariant (landlocked countries, area, island,…) as well as time-varying determinants (GDP, GDP per capita, economic governance, transport infrastructure, specialization, external tariffs as well as any determinant related to preferential market access such as the number of RTAs in which countries take part). Moreover, country-pair fixed effects (or first-differencing the data) account for dyadic determinants of trade (distance, contiguity, cultural proximity, common language…) and country-pair heterogeneity that are constant over time. Still, an endogeneity bias could arise because of omitted variables varying over time and affecting both the likelihood to enter one category of RTAs

Table 4 Robustness analysis: time-varying country pair–specific variables

Dependent variable	$\ln T_{ijt} = \left(\ln \text{imp}_{ijt} + \ln \text{imp}_{jit}\right)/2$			
	Interstate political affinity		Exchange rate volatility	
	(1)	(2)	(3)	(4)
Political arrangement	0.19** (0.09)	−0.03 (0.08)	0.18** (0.09)	−0.05 (0.08)
Preferential arrangement	0.21***(0.06)	0.25*** (0.06)	0.22*** (0.07)	0.11 (0.08)
Free trade area	0.31*** (0.08)	0.27*** (0.07)	0.29***(0.06)	0.20***(0.05)
Custom union	0.31*** (0.07)	0.29*** (0.08)	0.27*** (0.07)	0.31*** (0.07)
Common market	0.52*** (0.09)	0.26*** (0.09)	0.63*** (0.08)	0.19*** (0.08)
UN vote correlation	0.27*** (0.06)	0.06 (0.05)		
No. of peaceful years	−0.00 (0.00)	0.00 (0.00)		
Exchange rate volatility			−0.04 (0.04)	−0.02 (0.06)
Constant	0.23*** (0.09)	−0.77** (0.31)	0.82*** (0.05)	0.82 (3.21)
Overall R^2	–	0.38	–	0.36
Within R^2	0.72	–	0.76	–
No. of observations	25687	17297	21891	15187
Country-and-time fixed effects	Yes	Yes	Yes	Yes
Country-pair fixed effects	Yes	–	Yes	–
First difference	–	Yes	–	Yes

Heteroscedasticity- and autocorrelation-robust standard errors in parentheses. Coefficients for country-and-time and country-pair fixed effects are not reported

*, **, *** Significance at the 10, 5 and 1% level, respectively

and bilateral trade flows. In this section, I control for two such potential endogeneity issues: interstate political affinities and variations in bilateral real exchange rates.

Trade policy is considered by many countries as an instrument of foreign policy. For instance, Lederman and Ozden (2007) argue that the United States grant trade preferences, notably by signing bilateral FTAs, largely on a geopolitical basis. Maintaining good diplomatic relations is therefore likely to facilitate the negotiation and signing of an RTA. Besides, having good interstate political relations reduces the risk related to international trade and thus foster trade flows. Two variables are used as proxy for interstate affinity: the vote correlation in the United Nations General Assembly, taken from *The Affinity of Nations: Similarity of State Voting Positions in the UN General Assembly* developed by Erik Gartzke,[10] and the number of peaceful years between two countries, computed from the *Correlates of War Project*.[11] Results presented in Table 4 are mixed: UN vote correlation exerts a positive and significant effect on bilateral trade only in the fixed-effect specification, whereas having peaceful relations has no significant effect on bilateral trade flows. Nevertheless, controlling for political affinity does not alter our results on the equality of coefficients. Coefficients on CU and CM are slightly larger and the

[10] http://dss.ucsd.edu/~egartzke/.

[11] http://cow2.la.psu.edu/.

coefficient on FTA is lower in the fixed-effects specification, but only the coefficient on PA is affected in the differenced specification.

The volatility of nominal exchange rates create risks on international transaction and uncertainty at the firm level; it is thus likely that economic agents would be discouraged from trading with countries exhibiting a large exchange rate volatility with their home country. By reducing risks related to exchange rate variations, fixed exchange rate systems would then increase the volume of bilateral trade. At the same time, common currencies or monetary systems limiting currency fluctuations are mostly established on a regional basis. The volatility of exchange rates could thus be correlated to trade flows and the decision to create a RTA. To control for this potential omitted variable bias, I include a variable of exchange rate variability between countries i and j in year t, denoted vol_{ijt} in (1). Following Tenreyro (2007), the exchange rate variability is measured as the standard deviation of the first difference of (the logarithm of) the monthly exchange rate between the two countries:

$$\text{vol}_{ijt} = \text{SD}\left(\ln\left(e_{ijt,m}\right) - \ln e\left(_{ijt,m-1}\right)\right), \quad m = 1, \ldots, 12 \tag{2}$$

where $e_{ijt,m}$ is the monthly bilateral nominal exchange rate.

Data come from the IMF's *International Financial Statistics* and Reuters, provided by *EcoWin Financial*. The availability of data on monthly nominal exchange rates noticeably reduces the sample. Results are presented in columns (3) and (4) of Table 4. The coefficient on exchange rate volatility is negative but not significant in both specifications, which is in line with the ambiguous effect put forward in the literature (Tenreyro 2007). Turning to our variables of interest, results remain consistent with the benchmark estimates. It is worth noting that the fact that the coefficients on PA, FTA and CM are found slightly lower in the first-differenced specification, and the CM coefficient slightly larger in the fixed-effect specification, is related to the restricted sample rather than the inclusion of the variable of exchange rate volatility.[12] Again, the results on the equality of coefficients basically hold when controlling for the volatility of bilateral exchange rates.

The results presented in this paper are therefore robust to a number of robustness checks regarding lagged effects, the definition of RTAs, the period and countries considered, and the inclusion of time varying determinants of trade and RTA formation.

6 Conclusion

This paper investigated whether the form of RTAs matters concerning their effect on trade, in a gravity type framework differentiating four categories of RTAs according to the usual taxonomy initiated by Balassa (1961): PAs, FTAs, CUs and CMs. It shows a significant and positive average treatment effect of all kinds of RTAs providing trade preferences to their members on bilateral trade. However,

[12] Estimating the baseline model on this restricted sample yields the same results.

once self-selection into agreements is controlled for, their trade creation effect does not statistically differ according to the depth of the RTA: creating a FTA, a CU or a CM has a similar impact on trade among members. Different pairs of countries thus create different kinds of RTAs.

The latter result emphasizes that the different forms of regional integration do not reflect any larger potential trade creation effect. It suggests that the depth of RTAs should not only be defined on the criteria of their ability to foster trade. Instead, it should also be regarded as a question of political or institutional integration.

In addition, these results support a "market for regionalism" view of RTAs, where different country pairs choose to create different kinds of RTAs. Further work is nevertheless necessary to understand what drives gains from preferential trade integration and to highlight the determinants of successful integration processes according to both RTAs' and member countries' characteristics.

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Appendix: Regional trade agreements (1960–2000)

Name	Official dates	Actual dates (5-year intervals)
Common markets		
Benelux	1961	(1965–2000)
European Union (EU)	1992	(1995–2000)
Customs unions		
Eurasian Economic Community	1997	(2000–2000)
Equatorial Customs Union	1959–1965	(1960–1965)
Economic and Monetary Community of Central Africa	1994	(1995–2000)
Mano River Union	1973	(1975–2000)
Customs Union of West African States	1960–1966	(1960–1965)
West African Economic and Monetary Union	1998	(2000–2000)
East African Community	1967–1977	(1970–1975)
Benelux	1947–1960	(1960–1960)
European Communities (EC)	1958–1991	(1960–1990)
Customs Union EU-Malta	1971	(1975–2000)
Customs Union EU-Cyprus	1973	(1975–2000)
Customs Union EU-Turkey	1996	(2000–2000)
Customs Union Czech Republic-Slovakia	1993	(1995–2000)
Southern Common Market (MERCOSUR)	1991	(1995–2000)
Central American Common Market (CACM)	1993	(1995–2000)
Andean Customs Union[a]	1995	(1995–2000)
Caribbean Community and Common Market (CARICOM)	1973	(1975–2000)

Appendix continued

Name	Official dates	Actual dates (5-year intervals)
Free trade agreements		
Closer Trade Relations Trade Agreement	1983	(1985–2000)
Commonwealth of Independent States	1995	(1995–2000)
Papua New Guinea and Australia Trade and Commercial Relation Agreement	1977	(1980–2000)
Baltic Free Trade Area	1994	(1995–2000)
Central European Free Trade Agreement	1993	(1995–2000)
European Economic Area	1994	(1995–2000)
European Free Trade Agreement (EFTA)	1960	(1960–2000)
Group of Three	1995	(1995–2000)
North American Free Trade Agreement (NAFTA)	1994	(1995–2000)
South African Development Community	2000	(2000–2000)
Central American Common Market	1961–1975	(1965–1975)
Andean Free Trade Area[a]	1993	(2000–2000)[a]
Caribbean Free Trade Area	1968–1972	(1970–1970)
Armenia-Moldova	1995	(1995–2000)
Armenia-Russia	1993	(1995–2000)
Armenia-Turkmenistan	1996	(2000–2000)
Armenia-Ukraine	1996	(2000–2000)
Bulgaria-Turkey	1999	(2000–2000)
Canada-Chile	1997	(2000–2000)
Canada-Israel	1997	(2000–2000)
CARICOM-Dominican Republic	1998	(2000–2000)
Czech Republic-Estonia	1998	(2000–2000)
Czech Republic-Israel	1997	(2000–2000)
Czech Republic-Latvia	1997	(2000–2000)
Czech Republic-Lithuania	1997	(2000–2000)
Czech Republic-Turkey	1998	(2000–2000)
EU-Algeria	1998	(2000–2000)
EU-Bulgaria	1994	(1995–2000)
EU-Czech Republic	1992	(1995–2000)
EU-Egypt	1977	(1995–2000)
EU-Estonia	1995	(1995–2000)
EU-Hungary	1992	(1995–2000)
EU-Israel	2000	(2000–2000)
EU-Latvia	1995	(1995–2000)
EU-Lithuania	1995	(1995–2000)
EU-Morocco	2000	(2000–2000)
EU-Norway	1973–1993	(1975–1990)
EU-Poland	1992	(1995–2000)
EU-Romania	1993	(1995–2000)

Appendix continued

Name	Official dates	Actual dates (5-year intervals)
EU-Slovakia	1992	(1995–2000)
EU-Slovenia	1997	(2000–2000)
EU-South Africa	2000	(2000–2000)
EU-Switzerland	1973	(1975–2000)
EU-Syria	1977	(1980–2000)
EU-Tunisia	1998	(2000–2000)
EFTA-Bulgaria	1993	(1995–2000)
EFTA-Czech Republic	1992	(1995–2000)
EFTA-Estonia	1996	(2000–2000)
EFTA-Hungary	1993	(1995–2000)
EFTA-Israel	1993	(1995–2000)
EFTA-Latvia	1996	(2000–2000)
EFTA-Lithuania	1996	(2000–2000)
EFTA-Morocco	1999	(2000–2000)
EFTA-Poland	1993	(1995–2000)
EFTA-Romania	1993	(1995–2000)
EFTA-Slovakia	1992	(1995–2000)
EFTA-Slovenia	1995	(1995–2000)
EFTA-Turkey	1992	(1995–2000)
Estonia-Turkey	1998	(2000–2000)
Estonia-Ukraine	1996	(2000–2000)
Georgia-Armenia	1998	(2000–2000)
Georgia-Azerbaijan	1996	(2000–2000)
Georgia-Kazakhstan	1999	(2000–2000)
Georgia-Russia	1994	(1995–2000)
Georgia-Turkmenistan	2000	(2000–2000)
Georgia-Ukraine	1996	(2000–2000)
Hungary-Israel	1998	(2000–2000)
Hungary-Latvia	2000	(2000–2000)
Hungary-Lithuania	2000	(2000–2000)
Hungary-Turkey	1998	(2000–2000)
Kyrgyzstan-Armenia	1995	(1995–2000)
Kyrgyzstan-Kazakhstan	1995	(1995–2000)
Kyrgyzstan-Moldova	1996	(2000–2000)
Kyrgyzstan-Russia	1993	(1995–2000)
Kyrgyzstan-Ukraine	1998	(2000–2000)
Kyrgyzstan-Uzbekistan	1998	(2000–2000)
Latvia-Turkey	2000	(2000–2000)
Lithuania-Turkey	1998	(2000–2000)
MERCOSUR-Chile	1996	(2000–2000)
MERCOSUR-Bolivia	1996	(2000–2000)

Appendix continued

Name	Official dates	Actual dates (5-year intervals)
Mexico-Israel	2000	(2000–2000)
Mexico-Costa Rica	1995	(1995–2000)
Mexico-Bolivia	1995	(1995–2000)
Mexico-Nicaragua	1998	(2000–2000)
Poland-Israel	1998	(2000–2000)
Poland-Latvia	1999	(2000–2000)
Poland-Lithuania	1997	(2000–2000)
Poland-Turkey	2000	(2000–2000)
Romania-Turkey	1998	(2000–2000)
Slovakia-Estonia	1998	(2000–2000)
Slovakia-Israel	1997	(2000–2000)
Slovakia-Latvia	1997	(2000–2000)
Slovakia-Lithuania	1997	(2000–2000)
Slovakia-Turkey	1998	(2000–2000)
Slovenia-Estonia	1997	(2000–2000)
Slovenia-Israel	1998	(2000–2000)
Slovenia-Latvia	1996	(2000–2000)
Slovenia-Lithuania	1997	(2000–2000)
United States of America-Israel	1985	(1985–2000)
United States of America-Canada	1989–1993	(1990–1990)
India-Bhutan	1995	(1995–2000)
India-Nepal	1996	(2000–2000)
India-Sri Lanka	1998	(2000–2000)
Preferential arrangements		
Protocol Relating to Trade Negotiations among Developing Countries (PTN)	1973	(1975–2000)
Global System of Trade Preferences among Developing Countries (GSTP)	1989	(1990–2000)
Tripartite agreement	1968	(1970–2000)
Economic Cooperation Organization	1992	(1995–2000)
Gulf Cooperation Council (GCC)	1984	(1985–2000)
South Pacific Regional Trade and Economic Cooperation Agreement	1981	(1985–2000)
Melanesian Spearhead Group	1993	(1995–2000)
Council for Mutual Economic Assistance	1949–1990	(1960–1990)
ASEAN Free Trade Agreement	1992	(1995–2000)
Bangkok Agreement	1976	(1980–2000)
South Asian Preferential Trade Agreement	1995	(1995–2000)
West African Economic Community	1973–1997	(1975–1995)
Common Market for Eastern and Southern Africa	1994	(1995–2000)
East African Cooperation	2000	(2000–2000)

Appendix continued

Name	Official dates	Actual dates (5-year intervals)
Latin American Free Trade Association	1961–1980	(1965–1980)
Latin American Integration Association	1993	(1995–2000)
Andean Community[a]	1988–1997	(1990–1995)[a]
CARICOM-Colombia	1995	(1995–2000)
CARICOM-Venezuela	1993	(1995–2000)
Laos-Thailand	1991	(1995–2000)
Chile-Peru	1998	(2000–2000)
Chile-Bolivia	1993	(1995–2000)
Chile-Colombia	1994	(1995–2000)
Chile-Venezuela	1993	(1995–2000)
Political agreements		
Regional Cooperation for Development	1965–1979	(1965–1975)
Arab Maghreb Union	1989	(1990–2000)
South African Development Coordination Conference (SADC)	1980–1999	(1980–1995)
Cross Border Initiative	1990	(1990–2000)
Association of South East Asian Nations	1967	(1970–2000)
South Asian Association for Regional Cooperation	1985	(1985–2000)
Asian Pacific Cooperation	1989	(1990–2000)

Source: WTO (http://www.wto.org/english/tratop_e/region_e/region_e.htm), Foroutan (1993, 1998), Langhammer and Hiemenz (1990), Frankel (1997), Machlup (1977) and other public sources

[a] Peru entered the Andean Free Trade Area only in 1997, and did not join the Andean Customs Union until 2004

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